5 Hearing in the Music of Hector Berlioz

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Introduction: Imagination and the Position of the Subject

For a long time, Hector Berlioz was thought to hold a singular, even an isolated position in music history. Among the first to offer a new perspective was Pierre Boulez, who suggested that Berlioz's position in music history could be explained by 'the fact that a large part of his *œuvre* has remained in the realm of the imaginary'.[1] With this remark, Boulez alluded to the *Grand traité d'instrumentation et d'orchestration modernes* (1844/55), and more specifically to the chapter on the orchestra that closes the treatise. Speculations on the sound of an orchestra that would unite 'all the forces that are present in Paris and create an ensemble of 816 musicians' were, for Boulez, typical of Berlioz: 'mixing realism and imagination without opposing one to the other, producing the double aspect of an undeniable inventive "madness" – a fairly unreal dream minutely accounted for'.[2]

This chapter takes Boulez's diagnosis as a point of departure for the argument that the imaginary and the real mingle not *despite* both referring to the actual features of – in this case – an orchestra, but *because* they do so. As I will argue, 'inventive "madness"' indicates the way in which the real and the imaginary become indistinguishable in Berlioz's work. For this, I will analyse the role of hearing in his work on the one hand, and embed the analysis within a historical account of hearing, on the other. The guiding assumption is that the sense of hearing poses a peculiar challenge to the Romantic concept of the subject. Idealist philosophy had left the subject with the task of reconquering space from the subject's own position within it. Sensory physiology reacted to this by developing a new concept of experimentation that was exploratory rather than hypothesis-driven.

The first part of this chapter surveys this development with an emphasis on research into hearing. Building on this survey, I then reconstruct

[1] Boulez 1986, 175. [2] Boulez 1986, 177; 1985, 229.

perceptual positions emerging from Berlioz's music that draw on changes in intensity as the basic data from which a subject can understand its own position. As will be shown using the example of the *Symphonie fantastique* (1830), this can result in indistinguishability between the subject's perception and imagination. In the later opera *Les Troyens* (1856/63), Berlioz stages ghosts as figures that blur this distinction. Changes in intensity will again provide the main cue for making the ghosts' unstable nature plausible on stage. Both the example of the *Symphonie fantastique* and the apparition of Hector's ghost in the second act of *Les Troyens* strongly relate to the Romantic topic of the 'fantastic'. By contrast, the focus in my analysis will be to look at how Berlioz instantiated the perceptual aspect of the characteristic ambiguity between natural and supernatural explanations within the 'fantastic'. If previous analyses emphasised the pathological, my focus is on how realistic aspects create the condition for hearing.

One can assume that Berlioz was familiar with the contemporary discourse about experimental science through his studies in medicine that he pursued up to the degree of a baccalaureate in *sciences physiques*.[3] If this provides a basis for looking at how certain musical moments construct certain perceptual positions, it does not yet explain the specific situation on the opera stage. To investigate this, a final example will be discussed in which four shadows from the underworld urge Aeneas (Énée), the hero of *Les Troyens*, to leave his beloved Dido in Carthage and reach the shores of Italy. The conflict between present and absent spaces (both literal and spectral) in this scene will be used as the central argument for relating orchestration as the focus in Berlioz's theoretical work to his exploration of auditory perception. If the opera is a space for experimentation – my principal hypothesis – it is one that can include complex negotiations between acoustic situations.

Background: Sensory Physiology, 1800–1830

The listener of the early nineteenth century who notes or even analyses the quality of a sound seems something of an exception. Berlioz was such a listener: in his *Memoirs*, he described his experiences at the Paris Opéra:

> Not all places were equally good for hearing, I had tried them all and knew the defects and advantages of each. Thus in one you were on top of the horns, in

[3] On Berlioz's biography see Bloom 1998.

another you could hardly hear them. On the right the trombones were too prominent, on the left you got an unpleasant effect from the sound bouncing off the stall boxes. At the front you were too near the orchestra, and the voices were drowned; on the other hand, at the back you were too far from the stage to make out the words or the expressions on the actors' faces. The orchestration of this work should be heard from here, the choruses in that work from there. In one act, where the scene was a sacred grove, the stage area was enormous; the sound tended to disperse and lose itself about the theatre; in that case you had to go nearer. Another took place in the interior of a palace, and the design was what is called a box set, an apparently unimportant change which doubled the power of the voices: so it became necessary to move a little farther back to allow voices and orchestra to find a better balance.[4]

If this quote suggests a hearing subject that is aware of specific acoustic properties of the sound in the opera, this is not how the emergence of the nineteenth-century listener has been generally described. At first glance, the new Romantic listener seems characterised instead by the way in which he or she got rid of all allegedly objective references. As James Johnson has pointed out, listeners became convinced 'that their musical experience was unique', discovering along the way the diversity of subjective feelings in their own listening, and, rather than referring to shared emotions, declared with Adolphe Guéroult that music 'speaks to the soul without appearing to the senses'.[5]

Yet this is only one aspect of a new concept of the subject that emerged around 1800. No less important was the quest for the conditions in which subjectivity becomes possible.[6] The shift towards an inherent self-relation has been identified as the defining trait of this modern concept of subjectivity. As Jonathan Crary has argued, a quest for understanding perception during the nineteenth century began with Johann Wolfgang von Goethe's *Farbenlehre* (1810) and can be pursued in contemporary physiology.[7] Goethe proposed that to understand perception one should try to perceive perception itself.[8] Following Goethe's turn towards subjective experience, physiologist Jan Evangelista Purkyně scrutinised what he called 'subjective phenomena'.[9] He

[4] Berlioz 1969, 91–2.

[5] Johnson 1995, 274; Guéroult, 'L'Eglise et l'opéra', quoted in Johnson 1995, 274.

[6] Dieter Henrich (1993) has formulated this problem for Early German Romanticism and the emergence of idealistic philosophy.

[7] Crary 1990. On Romantic science more generally cf. Cunningham and Jardine 1990; Poggi and Bossi 1993.

[8] Crary 1990, 17. On Goethe's *Farbenlehre* see also Schäfer 2011.

[9] On Goethe and Purkyně cf. Vogl 2007.

established that perceptual phenomena that did not exist outside human perception – such as after-images – nevertheless occurred lawfully and could be considered as appropriate objects for scientific investigation.

This new physiological approach to subjectivity distanced itself from the study of perception that sought to understand how an outer world entered the human mind. Broadly speaking, whereas German physiologists opposed this view in researching 'subjective phenomena', French physiologists most explicitly called for a radical change from a qualitative and descriptive operational mode to a quantitative use of experimentally generated data. Within the history of French physiology, François Magendie has long been considered a key proponent of this change.[10] Whereas eighteenth-century physiology based its understanding of the organism on anatomy and tried to explain the functions of the organs from this perspective, Magendie first looked at functions and then went towards the organs involved. He reproached previous physiologists for using a notion of experimentation that was only able to confirm preconceived classifications: 'One seeks that which must be, and not that which is.'[11]

Instead, he pleaded for a mode of experimentation that would discover new phenomena: physiology had to adopt an exploratory mode of experimentation.[12] Magendie explained this new approach in his textbook, *Précis élémentaire de physiologie* (1816–17), in which he also summarised the state of knowledge in physiology, including his own experimental studies. Although he was modest in his assumptions about the book's appeal – which he claimed was written simply to introduce students of medicine to human physiology – the methodological tenets articulated there have been seen in French history and philosophy of science as a decisive step towards the modern life sciences.[13]

Magendie's new concept of experimentation freed physiology from anatomy, as it no longer assumed that the only secure knowledge of living organisms could be won by post-mortem anatomy. Instead he claimed to base his research solely on the 'observation of healthy and ill men and experiments on living animals'.[14] Sensory perception was a case in point. Too little was known about the ear in particular to permit a conclusive understanding. Anatomical studies of the ear had provided important findings, including the first description of the membranous labyrinth; but

[10] This historiography goes back to Magendie's disciple Claude Bernard; see Albury 1977.
[11] Magendie 1816–17, 1:6. [12] See Steinle 2001, 2016.
[13] Cf. Rothschuh 1968; Albury 1974.; Canguilhem 2002, 226–74. [14] Magendie 1816–17, 1:v.

its author, Antonio Scarpa, could only warn physiologists not to speculate about the functions of the nerves that he had found to end in a muddy substance in the labyrinth.[15] For the moment, anatomy had reached its limits.[16]

Nevertheless, Magendie insisted that experience permitted certain observations. He was the first, for instance, to prove experimentally that both ears are used for discerning the direction from which a sound reaches us. After having someone produce a sound in a dark place, he noted he was unable to identify that sound's direction with one ear plugged. Using both ears, this became possible again.[17] Magendie ascribed his finding to the possibility of comparing the intensity received by both ears. Intensity, however, was a problematic concept in itself: it was the cue for understanding auditory space, but it was also a source of constant error. To some extent, the distance of a sound could be judged based on that sound's intensity because a sound that is nearer would sound stronger, and a distant sound softer. In order to judge this, however, the nature of the sound had to be familiar. A soft sound could just as well come from a source nearby and a loud sound from a distant source. Magendie concluded: 'We are easily deceived about the point where a sound originates.' Hearing was therefore subjected to frequent 'acoustic errors'.[18]

The ambiguity Magendi noted for auditory intensity was one of the main characteristics of intensity more generally. For the physiologist and comparative anatomist Johannes Müller, intensity was an integral part of his new concept of perception.[19] Müller published two treatises on vision in 1826, where he laid out his theory of the relation between perception and nerve physiology.[20] In the first, *Zur vergleichenden Physiologie des Gesichtssinnes des Menschen und der Thiere*, he presented a comparative physiology of the sense of vision in humans and animals. Building on Goethe and Purkyně's studies of subjective phenomena, the second treatise, *Ueber die phantastischen Gesichtserscheinungen*, presented Müller's theory of 'specific sense energies'. According to this theory, every nerve was imbued with a specific capacity to produce sensations or to stimulate action. This capacity was independent of any concrete stimulus. A stimulated nerve would thus always produce the reaction for which this

[15] See Magendie 1816–17, 1:141. Magendie refers to Scarpa 1789.
[16] On microscopy before and after the development of microtomes see Schickore 2007.
[17] Magendie 1816–17, 1:107. [18] Magendie 1816–17, 1:151.
[19] On Müller see Hagner and Wahrig-Schmidt 1992; Otis 2007; Meulders 2010, 43–54.
[20] J. Müller 1826a, 1826b.

particular nerve was appropriate, rather than reflecting the properties of the stimulus. A nerve leading to a muscle would always make this muscle contract; the optic nerve would always produce sensations of light; and the auditory nerve sensations of tone – regardless of how it was stimulated: mechanically, through chemicals or electricity, or any other means.

Given that a nerve could be excited by any stimulus, intensity – that is to say, the degree of 'energy' conveyed – remained the only aspect of sensation that related to the stimulus and thus potentially the outer world. A nerve could specify sensory perception in two respects: it could bring its own specific energy to the awareness of the subject, and it could convey the degree of its stimulation. As Müller noted, changes in sensory energies played a critical role in helping the subject to construct a relation to the outer world. He later specified: 'The mind not only perceives the sensations and interprets them according to ideas previously obtained, but it has a direct influence upon them, imparting to them intensity.'[21]

Based on his theory of sense energies, Müller tried to develop a purely physiological concept of the mind. Imagination, he assumed, eventually had to be explained as a product of nervous activity. Müller did not spare himself from self-experimentation to explore those nervous activities that appeared to the perceiving subject as the mind. He drove himself to hallucinate through artificially induced insomnia, hoping that this would make him better understand the laws that regulate 'phantastic visions'. He published the results in his treatise on hallucination and suffered a nervous breakdown shortly thereafter.[22]

Hearing in the *Symphonie fantastique*

Johnson's cultural history of listening and Crary's analysis of the history of perception both centrally address the role of the subject. Similarly, musicologists in the 1990s revisited the role of the listening subject – with the aim of re-establishing hermeneutics in response to the predominance of structuralism that had held sway in the post-war humanities, often with an underlying intention of getting rid of a problematic past.[23] For the new musicology, the diversity of listeners' interpretations also offered the possibility of readdressing the hegemony of absolute music. Part of this

[21] J. Müller 1843, 717. [22] See Otis 2007, 44–5.
[23] Critical approaches to this pervade current musicology up to N. Cook 2002.

enterprise was to change the status of allegedly extra-musical aspects and to emphasise their value for understanding music.

Although this critique was directed against an essentialist concept of music in the first instance, it was also brought to bear on musical performance. Listening and hearing were separated once again, reducing sensory perception to a negligible precondition. Updating early nineteenth-century claims that music speaks more to the soul than to the ear, various musicologists now assumed that if a concept of music exists, it is to be looked for in the individual subjects. Similarly, the way in which nineteenth-century listeners conveyed the individuality of their feelings spoke to the hermeneutics of the late twentieth century. Support for the new mode of interpretation came from literary studies, and more specifically, narratology. Consequently, the study of nineteenth-century symphonic music has, in the context of new musicology, tended towards understanding music in narrative terms.[24]

In the case of Berlioz's *Symphonie fantastique* this situation is reversed. While programme music seems a case in point for studying a composition's 'verbal tale', it did not have the appeal of idiosyncrasy. Ever since Berlioz himself distributed the programme notes to the first performance, the story of an opium-induced vision of unfulfilled love and gruesome death amid the scenery of Paris in the 1820s has established the task for the listeners' imaginations.[25] As Francesca Brittan has argued, narration, and more specifically the genre of the fantastic, is the key to this composition, providing an unexpected bridge to contemporary attempts to objectify knowledge of the individual.[26] Fantastic narration, as it has been defined since Tzvetan Todorov's *The Fantastic: A Structural Approach to a Literary Genre* (1975), departs from a characteristic ambiguity between natural and supernatural explanations of related occurrences.[27] This enabled a reference to discourses of 'objectivity' in a new way, mediated through medicine and psychiatry. The *Symphonie fantastique* fits seamlessly into this context. This piece demonstrates that this new approach, in taking the narrative seriously, would neither drop subjectivity nor overstate objectivity.

One of the most prominent instances of the fantastic in the *Symphonie fantastique* is the beheading of the hero in the fourth movement.[28] As French epistemologist George Canguilhem has pointed out, the guillotine

[24] Classic texts on narration in music include Nattiez 1990; McClary 1997; Hepokoski 2002.

[25] See, for instance, Kregor 2015, 70–9; for another perspective, including a reference to Berlioz's own statements on this matter see Langford 2000, 54.

[26] Brittan 2006, 2007. [27] See, for instance, Langford 2000. [28] See Ritchey 2010.

obsessed physiologists in the aftermath of the French Revolution. The question of whether or not head and body would continue to sense after the beheading turned nerve physiology into a pressing topic.[29] Scottish anatomist Charles Bell first advanced the hypothesis that two different kinds of nerves lead from the body towards the brain and from there back into the body. Magendie provided the first empirical evidence, but the dogs he used in his *in vivo* experiments were in too desperate a state to allow for further differentiation.[30] Müller repeated the experiments and, using frogs instead of dogs, was able to corroborate Bell's hypothesis.

Taking this fascination with beheading as a point of departure, the following comments on the *Symphonie fantastique* suggest that the history of physiology offers a reference not only for understanding nineteenth-century art, as demonstrated by Crary, but also musical composition. Reconsidered in this way, the oft-analysed fourth movement of the symphony can be described as a play with aural perceptions in the context of the situation depicted by the programme. More specifically, the music provides cues for an implicit position of a hearing subject. This is not to say that this position is homogeneous, nor that there is only one such position. Rather, it is necessary to differentiate between at least two types of position: that of a subject who listens to Berlioz's composition, and that of a perceptual position – or several of them – from which the acoustic events in the music are presented. Borrowing a term from theatre studies, these two positions could be called the intra-diegetic and extra-diegetic levels in the overall acoustic presentation.[31]

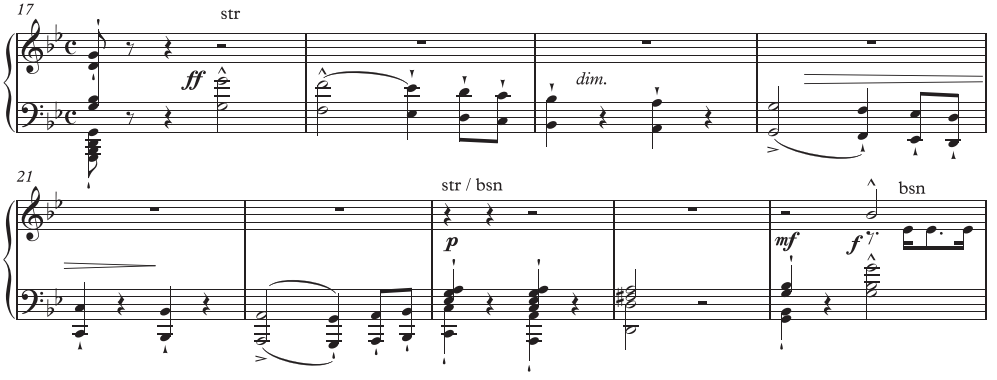
Yet the construction of these positions cannot be achieved by imposing the programme upon the sonic events. This would reduce the role of hearing to the intra-diegetic position of a hearing subject within the narration that is detached from the concert-listener's position to be then attributed to the narrated events *ex post facto*. This, however, is insufficient for describing Berlioz's music. Rather, the intra-diegetic position is and must be constantly corroborated through acoustic features in the music. To this end, the music also reflects accidental features of the sounds that reach the implicit position of hearing. Sounds can, for instance, arrive earlier or later at that position, they are clear or muffled, louder or softer. In other words, the concert-listener must be aware of cues that point to the effects of

[29] Cf. Canguilhem 1993; Schmidgen 2006.

[30] Magendie 1822; see also Otis n.d., 4. For Magendie's research on nerve sensitivity see Canguilhem 1955; 2002, 295–304.

[31] See Pfister 1988.

Example 5.1 Hector Berlioz, *Symphonie fantastique*, arr. F. Liszt, IV: March to the Scaffold, bb. 17–25



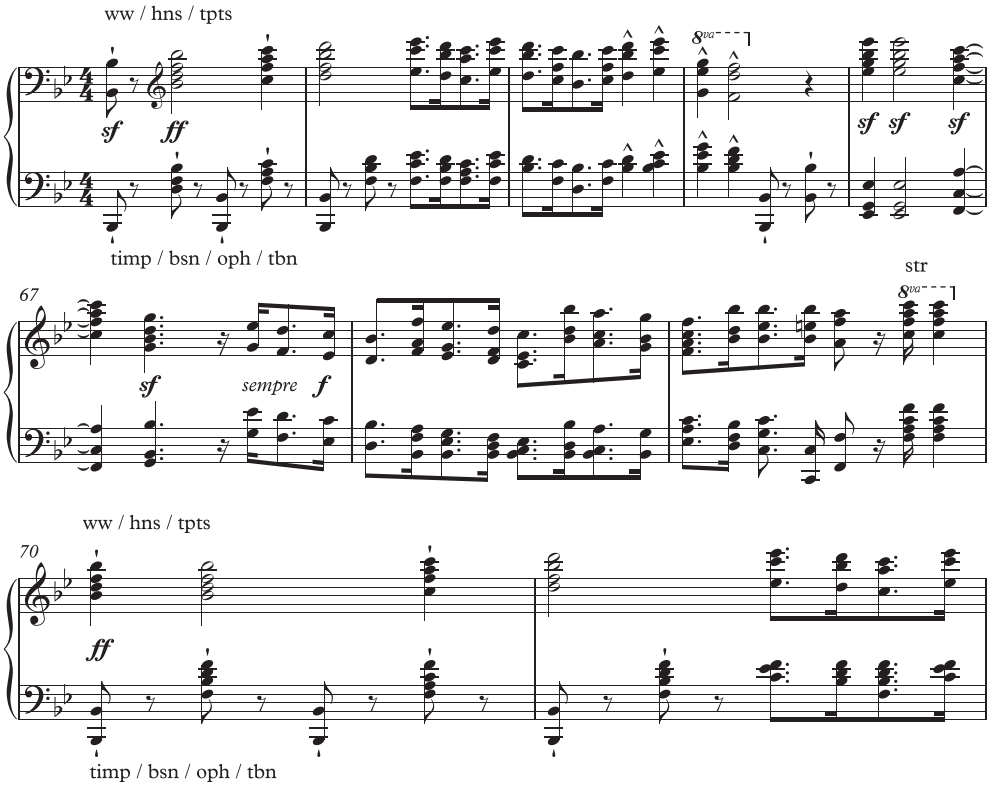
hearing for construing the intra-diegetic level. In this way, the hero emerges within the narration as a position of intra-diegetic perception along with the music.

This double play of listening to hearing begins from the very first bars of the 'march to the scaffold' that convey the sound of an approaching marching band. Already here, a fixed position is implied, from which the band's arrival is observed. Yet, at this moment in the music, this could be anyone's position except the concert-listeners'. The position that the concert listeners must construe is clearly fictitious, even if it is not yet clear to them whose position it will be. They see the instrumentalists remaining in their places, while the sounds get louder, and they are invited to accept an additional position within the narrative, from which the increase in loudness makes acoustic sense as a nearing marching band. The approach of these sounds is set to music with considerable acoustic realism. Soft drums are heard first; the motif that next appears in the French horns enters pianissimo, as if as yet too far to be properly discerned. The increasing proximity of the sound is further depicted by foregrounding low instruments, whose sonic energy disperses less quickly and therefore reaches further than high-pitched notes. Higher registers gradually join in, making the orchestration ever more detailed and thus appearing as a sound mass that approaches ever nearer.[32]

That said, the music does not fully map onto the acoustic image of a marching band that becomes louder and louder, either. Abrupt switches to

[32] For an analysis of spatial effects in the orchestral timbre of the *Symphonie fantastique* see Tan 1997; and on Berlioz's orchestration treatise see F. Kolb 2016.

Example 5.2 Hector Berlioz, *Symphonie fantastique*, arr. F. Liszt, IV: March to the Scaffold, bb. 62–71



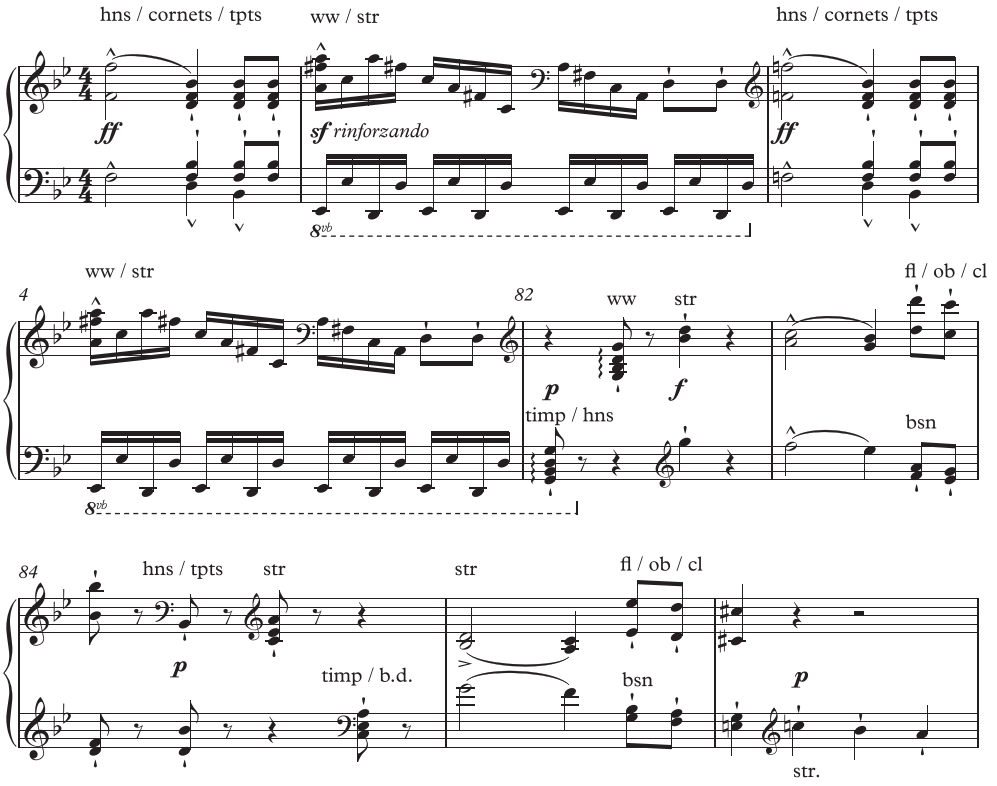
high-pitched fortissimo notes which are followed by a release of tension in all musical parameters, as if becoming exhausted (see Example 5.1), present a different perspective to that of an approaching sound mass. Whereas the acoustic image of the marching band refers to a growth in tension for external reasons, the repeated alternation between soaring effort and exhaustion suggests a layer of intensity that is not acoustic in the same sense, but instead is inward bound. The role of this superimposed dynamic layer remains ambiguous, however, as long as the overall increase in loudness persists and as long as each of the release-phrases lands on a last accented note, thereby creating the association with a heavy, slow gait. When a triumphant new motive (see Example 5.2) shifts the accent of the phrase to the first beat in the measure, this gives the concert audience to understand that the marching group has arrived at its destination: the spot where the execution takes place.

The next step the music depicts is catastrophic. The position of intra-diegetic hearing within the musical texture and the concert listener's position collapse into one. The main theme is now so close to the implicit perceptual standpoint that it cannot be attributed to one single instrumental line any longer. All instruments seem now to be at the same distance from this position, encircling the spot where it is located. As Example 5.3 shows, after a fanfare in the brass (bb. 78–81), the notes of the main soaring theme jump from one instrumental group to the next so swiftly that they hardly form motivically coherent sections of their own (bb. 82–85).[33] They seem reduced to a stutter – or, in the terms of the implicit perception – a disorientation: the intra-diegetic position of perception now emerges as that of the subject-to-be-executed. The concert listener, too, cannot distance him- or herself from that position, and must share the sense of disorientation. Nothing but the distorted position of that hearing subject is given in the music. After this collapsing of the two perspectives, the rhythmic structure of the march breaks down, descending in a tumbling hemiola. What follows depicts the execution, after which only silence is left for an implicit hearing subject or, as we learn retrospectively, hallucination.

All these observations corroborate a reading of the *Symphonie fantastique* as relating to the narratological category of the fantastic, in that they demonstrate once more the ambiguity between what can be explained as realistic and what appeals to other modes of explanation, including the appeal to supernatural forces. This also applies to the various acoustic positions in the music. The positioning of the audible events oscillates between a precise rendition of possible acoustic relationships and musical features that reach beyond such realism, creating at the same time a tension between the local specificity of such a position and the encompassing and extra-diegetic position of the concert listener. If this multiplicity of perceptual modes is to include the implicit perceptual position of the hero, who now appears to be the executioner's victim, this is not achieved through a mere representation of a narrative, but instead employs the double play of listening which constantly refers to instances of imagination *and* of hearing. Hearing – as opposed to listening – does not imply knowledge about what will be heard. It is a mode of gaining knowledge rather than of communication. The musical process of juxtaposing acoustic positions and creating tensions between the perception of outer and inner worlds provokes such a concept.

[33] Tresch 2011.

Example 5.3 Hector Berlioz, *Symphonie fantastique*, arr. F. Liszt, IV: March to the Scaffold, bb. 78–86



Hector Speaks

In his collection of essays *À travers chants*, Berlioz listed among the basic 'elements of music' the 'degree of intensity' and the 'point of departure' of sounds. Both refer to qualities of sound that are considered irrelevant for a notion of musical composition whose essence is rooted in the symbolic operations of counterpoint. Berlioz, by contrast, referred to audible effects as constitutive for his compositional practice. He explained: 'By placing the listener closer or farther away from the performers and, on certain occasions, placing instruments at a distance from each other, one can bring about changes in the musical effect that have not yet been adequately studied.'[34] In the *Symphonie fantastique*, he not only used this as a device for orchestration – think, for instance, of the dialogue between an oboe and

[34] Berlioz 1998, 5; on this collection see K. Kolb 2009.

English horn across the space of the concert hall – but he addressed the listener's imagination in a play of distance and intensity, as the analysis above has sought to demonstrate.

When it comes to operatic music, the compositional treatment of intensity in space shifts to a different level. Points of perception can now be embodied in the actors on stage, and the semantics of audible cues can be delivered together with the sounds. This, in turn, affects the role of imagination. Arguably, Berlioz could lean on his vast knowledge of opera for developing the acoustic image of the march in his *Symphonie fantastique*. The contrast between the real and the imaginary that created the peculiar musical fantastic, however, is enhanced in the symphony by the fact that no visible narrative explains to the listener which sounds have to be understood as being intra-diegetic. When comparing this to Giacomo Meyerbeer's excessive use of offstage sound, for instance in *Les Huguenots*, the difference becomes apparent. As Mary Ann Smart has shown, Meyerbeer uses an encoding of meaning to integrate offstage sounds into the operatic narrative, in addition to employing them for acoustic effect.[35] The offstage choral singing in *Les Huguenots* that alternates a Protestant chorale with a belligerent chorus of the intruders who are about to massacre them cannot be seen on stage, but it is understood through the semantics attributed to each of the alternating fragments. The acoustic effect is subordinated to the narrative. Berlioz, in contrast, needs acoustic realism to pair it with the uncanny also on the operatic stage. Reimporting the effects that originated from opera into his own operatic music, he still employs such juxtapositions of modes of hearing.

A compelling case in point is the presence of ghosts, who appear in several of Berlioz's vocal compositions. Most prominently, they give voice to fate in *Les Troyens*. The plot, constructed around Aeneas' destiny to found the Roman Empire, employs supernatural authorities to communicate to Aeneas what he should do instead of dying for Troy or staying with Dido in Africa. At first sight, the ghosts seem yet another token of the fantastic. Yet on stage, the nature of the ambiguity between natural and supernatural explanations shifts. Ghosts on stage undermine the secure demarcation between the tangible and the figment of imagination.

Hector's ghostly appearance in the second act of *Les Troyens* can be seen as a model for how this ambiguity is embodied on the stage. The same problems identified by Stephen Greenblatt for staging a ghost in the

[35] Smart 2004, 102–31, esp. 105f.

theatrical space (where does the ghost come from? how can it be present without being there?) also occur in opera, yet with other means of resolution.[36] The stage directions for the apparition of Troy's dead hero are simple. He enters the stage and walks slowly towards the sleeping Aeneas, who awakens because of the battle noises of the falling city. Hector then conveys his message and walks away again, disappearing into darkness. That he is not just another human actor but a shadow from the underworld is indicated in several ways. The music shows a calculation of sound intensities that stages the ghost as heard, combining the two aspects of hearing and intensity in a liminal moment between the living and the dead. If his moment of visual appearance requires nothing more than an 'obscure corner' from which he solemnly advances, his exit is set both visually and musically as a gradual fade-out, thereby challenging the limits of auditory perception.[37] In fact, the acoustic exit already begins with the first words he addresses to Aeneas. The recitation gradually descends in chromatic steps through the octave b♭ to B♭. The score indicates that Hector's voice should become more and more feeble as he recites ('*La voix d'Hector doit s'affaiblir graduellement jusqu'à la fin*').

The descending line of the ghost's utterance takes up a figure that Berlioz had already explored in the song 'Spectre de la rose' from the song cycle *Nuits d'été* (1840/41). Here it is set to a line in which the ghost explains where he comes from. The descending, non-legato chromatic line ends on the words 'De profundis', i.e. the incipit of Psalm 130, which stands here for a part of the Christian funeral rite. Berlioz embeds this connotation within an opposition of musical registers. Having reached the lowest point, a melodic upsurge gives way to the ghost declaring that he comes from Paradise.

This spatial contrast is transformed on Hector's first appearance. The ghost seems to be in a state of speaking only after an initial blow in the orchestra has prepared the appropriate energy level for him to enter the acoustic world. From there, his voice glides down on the declining energy of that blow to end in silence. Berlioz stages the utterance of the ghost according to a surprisingly precise idea of sound energy, as it could be described in modern terms: a peak of energy must precede any sound that enters the audible realm. Yet this acoustic envelope at the same time

[36] Greenblatt 2001.

[37] Here and in the following I use the New Berlioz Edition (Berlioz 1967–2005), indicated as NBE; quote cited in Hector Berlioz, *Les Troyens*, 3 vols. (NBE 2a–c), ed. Hugh Macdonald, vol. 2a (1969), 211, 215.

reveals that the ghost's existence is not granted. Hector's materialisation depends on an effort that cannot be stabilised.

Hector's entry is embedded in music and scenic action that bear witness as much to his being there as to his liminal state. From the very beginning of the act, the acoustic scenery had been split in two layers. The stage directions – 'distant battle noises' – describe an acoustic layer that is not per se musical and whose source is invisible.[38] Although there is no indication of how the battle noises are put into effect, this in fact gives them a status that for Boulez would be imaginary: it is clear from the indications that they are meant to be independent of the music. In addition, the score specifies that four instruments – two trumpets and two cornets à piston – are located behind the scenes. The military fanfares they interpolate do not coincide with the indication of the battle noise in the score; however, nor do they picture the events described in the stage directions. Rather, the offstage instruments subsume the outside noise into the main musical stratum whose status is not intra-diegetic. The players join the orchestra before the curtain is drawn.

The first activity on stage is a pantomime: Ascanius enters and sees his father, Aeneas, soundly asleep. Ascanius 'harkens' to the outside noises, but as the noises become weaker, he exits without having dared to wake his father. His action confirms the two acoustic layers: the music articulates Ascanius' movements, whereas the battle noise is now marked as belonging to the diegetic world, which – although offstage – can be perceived on stage. That Ascanius could hear the noise, whereas it did not rouse Aeneas, has become a meaningful detail of the acoustic scenery.

Hector enters only after this confirmation of the battle noise's diegetic role. With his entry, the music drastically changes in character. Four horns tuned to chromatic steps from d to f set the tone for a slowly creeping melody in the first horn. Berlioz purposefully asks for stopped notes in the horns, although he prescribes both cylinder and natural horns.[39] The uncanny, hesitating atmosphere is further enhanced through pizzicato and tremolo notes in the strings and a heartbeat-like rhythm in the

[38] Berlioz, *Les Troyens* (NBE 2a), 1:203. I thank David Trippett for pointing me to Berlioz's mention in the 1844 edition of the treatise that the bass drum, struck softly, gives the sound of distant cannon fire. I agree with him that some instantiation of the stage directions in line with such suggestions is implied here, without, however, changing the status of these stage directions as being a linguistic description whose function cannot fully be replaced by concrete indications.

[39] See Macdonald's (2002, 160–3) commentary on the horn section in the *Grand traité*.

timpani. To these sounds, the shadow walks towards the sleeping human, giving a deep sigh as he stops next to Aeneas.

As long as Aeneas remains asleep, the relation of the music that accompanies the apparition to the diegetic world remains ambiguous. Aeneas obviously neither sees nor hears the ghost. For the moment, only the spectator can observe the spectre. The new orchestral colouring does not integrate any of the sounds connected to the battle outside Aeneas' room. With a fortissimo blow in the orchestra, a sudden clash of the world of humans and ghosts turns Hector into a perceptible phenomenon for Aeneas. Aeneas is said to awaken from an offstage rumbling of some building collapsing outside that is 'heavier than those before', and he immediately becomes aware of Hector.[40] After these two blows the two worlds begin to interact, and the stage indications referring to outside noise cease. The music now forms a realm wherein the shadow and the human can encounter one another.

Aeneas addresses the apparition, asking Hector what has brought him back to the human world. His utterances demonstrate vivid agitation, as expressed in the agile rhythm and variety of his articulation. Nevertheless, they resemble Hector's utterance to some extent, as they compress its features into the extension of less than a single bar. A stepwise downward movement prevails, but it is enlivened through melodic upward peaks and a heavy oscillation between dynamic extremes in the orchestra. Aeneas' prosody is fully in possession of such expressive features: he imposes his own articulation upon what is indicated in the score as 'recitation'. By contrast, the ghost is bound to a non-expressive articulation that reduces all musical parameters to a minimum. He recites on one note, making only small melodic steps, finishing one phrase with a minor second downward or beginning a phrase a minor second below the previous one. The rhythm is reduced to a syllabic declamation of the text. No agogic freedom is foreseen. The score indicates the ghost's articulation to be 'measured', resembling in this respect the diction of the Commendatore in Mozart's *Don Giovanni*. Most significantly, the dynamics indicate a loss in tension. Hector's last words are barely audible. Human and ghost follow the same prosody, but differ in their ability to enliven it.

The appearance of the ghost onstage creates a peculiar relation to the perceiving subject. The situation it creates does not engage the spectator in a play of subject positions, but of acoustic layers.[41] The human actors

[40] None of the available audio-visual recordings follows these instructions.
[41] Bockholdt (1979) carries out analyses of such strata.

implement their points of perception and thereby confirm the intra-diegetic presence of sounds. The liminal state of the ghost interferes with the intra-diegetic sounds in complex ways. The music that accompanies the ghost oscillates between an extra-diegetic function and an utterance that is audible for Aeneas. While the utterance of the ghost appears less expressive than Aeneas' lively human speech, it is also more musical in that it emphasises the skeleton of musical and acoustic parameters that allow the shadow to enter the perceptible realm. The materialisation of the ghost thus involves music in a way that transforms the relation between the imaginary and the real into an ambiguity between the extra- and intra-diegetic roles of sound and music onstage. The presence of the ghost is translated into the presence of sound. The ghost needs to be heard before one can listen to it.

Contrasts of Space and Colour

The second part of *Les Troyens* centres on a conflict between spaces. Aeneas' fate ordains that he will reach Italy, but his love of Dido ties him to Carthage. Troy and Italy, that is to say the absent spaces, exert pressure on the hero, who wishes to stay in the here and now. His fate intervenes through the utterances of supernatural voices. Named and unnamed voices haunt him, calling from offstage. Aeneas' resistance to leaving Carthage eventually provokes Hector's second appearance, this time accompanied by his father, Priam, his sister Cassandra and her groom Chorebus, all of whom died in Troy. This apparition marks a turning point in the plot. After all the authorities from Troy are summoned onto the scene, their calls finally reach Aeneas.

The ghosts literally leave him no escape. A choir of bass voices opens the scene, incanting his name on the note D that remains present as the ghosts' reciting tone throughout the scene. The veiled ghost of Priam then appears on the left side of the stage and pronounces a first call on the same pedal D. He urges Aeneas not to postpone the departure, joined by the as-yet-invisible Chorebus, Hector and Cassandra. After these interpellations, a crown of pale flames lights up on Priam's head. He identifies himself to Aeneas and conveys his message: 'I am Priam, you have to live and part.' Aghast, Aeneas recoils from the spectre, only to encounter Chorebus on the other side of the stage. The ghost appears and identifies himself in the same way and continues the message: 'you have to part and conquer'. Again, Aeneas recedes, but this time the ghosts of Hector and Cassandra

hinder his way. Aeneas immediately recognises them and they finish the message, always remaining on the pedal tone *d*: 'you have to conquer and found!' Aeneas bows to his fate and awakens his men to leave for Italy.

The crowns that make the ghosts visible epitomise the embedding of the opera into a framework of energy transfer. The flames use the same technology as do manometric flames that came into use at this time for scientific instruments. The Paris-based instrument maker Rudolph Koenig, with whom Berlioz was acquainted through the eminent violin builder Jean-Baptiste Vuillaume, used such flames in his *analyseur du timbre d'un son*, a device that showed the strength of the harmonic components in a musical tone with the help of such a flame. A sung vowel, for instance, would be rendered as a series of smaller and larger flames in a turning mirror next to the flame. The drawings arising from such analyses circulated widely, appearing as rows of flames of different height, although the image actually was made of a chronological decomposition of different states in one single flame.[42]

Although we can exclude the idea that Berlioz connected the appearance of the spectres to a notion of the spectrum – the transfer of this term to acoustics only happened in the twentieth century – the detail is nevertheless characteristic for the concept of timbre at stake in this scene. In Koenig's *analyseur* the vowels had to be sung on the same pitch, for the pitches of the analysing devices could not be changed, yet the flames showed the vowel sounds to be composed differently.[43] Similarly, the entrance of each ghost is accompanied by a chord on the pedal tone *d*, on which they also recite their message. As their utterances become more and more pressing, the harmonic tension in the chords rises. The ghosts appear as instantiations of the voice of fate that is articulated more and more urgently, yet without changing its core message: Aeneas must part.

No less significant in this scene is the orchestration. Along with the flames, four solo violins play piercing flageolet-chords, indicated in the score as *sons harmoniques*, whose high pitches stand out against the predominantly low register of the orchestral sound. More importantly, flageolet-tones come close to a single frequency and their sound contains

[42] On Koenig, see Pantalony 2009.

[43] Koenig later builds resonators whose size can be changed, thereby making them able to react to different frequency components in incoming sounds. He calls the corresponding complex of resonators 'analyseur du timbre des sons'. On the history of the resonator see Pantalony 2009, Kursell 2018.

little noise. This makes them particularly hard to localise for human hearing. The acoustic marker for the ghost's visibility withdraws spatial cues from the sound.

Orchestration is the main device in this scene. It opposes a non-localisable, insisting tone to the haecceity and fluidity associated with human actors. The ways in which Berlioz achieves this can be seen as substantiating the concept of timbre he coined in his *Grand traité*. In the introduction he explains that the aim of orchestration is to produce 'impressions *sui generis* (whether or not motivated by expressive intention) and independent of the three other musical powers [*sc.* melody, harmony, rhythm]'.[44] With this remark he declares timbre to be a factor independent of the overall musical texture that has its own specific relation to expression. Acting as a truly independent force, timbre's expressive value is described by a gradient of its own that ranges from paucity to prevalence over the other musical powers.

The second part of *Les Troyens* translates this into the central topic of spatial conflict. The intervention of 'fate' is characterised by a zero-degree of spatial orientation. Sounds in the second ghost scene create a tension without melodic change and localisable movement. The force that encircles Aeneas has no spatial identity and can appear everywhere. The depth of the pedal tone *d* reaches beyond the regular orchestral range, as the double basses tune their lowest string a second down to the contra-octave *d* during this passage. The flageolet notes, as well as the other instrumental colours, such as the bass clarinet and the four horns, which this time all transpose at the same pitch to support the pedal tone, are chosen to create 'ghostly music', as Berlioz describes it in the *Grand traité*. The voices of the ghosts recite their texts on their lower range. The middle range, in which human hearing distinguishes acoustic parameters particularly well, is left empty.

Within this setting, the pedal note acts as a motif that is reminiscent of Aeneas' fate. As shown, this pedal's function is not purely harmonic. Rather, one might refer to it as a *note-son*, a term coined by Jean Barraqué to connote a recurring pitch that becomes notable within a sonic environment.[45] For this, the *note-son* oscillates between functioning as a pitch and a timbre. Similarly, the pedal on *d* is motivated in two ways. Even though it is at times disconnected from the overall harmonic

[44] Hector Berlioz, *Grand traité d'instrumentation et d'orchestration modernes*, ed. Peter Bloom (NBE 24), 5.

[45] Barraqué (1962) calls this a *note-son*, as opposed to the *note-ton* that refers to the note as a symbolic element.

progression, it must continue because it allows the ghosts to articulate their messages. In addition, it gains a characteristic colour through the fact that the low *d* marks the low end of the voices' articulatory range where they seem to neither speak nor sing. What is more, the *note-son*'s persistence adds to the rising harmonic tension. Remaining constant against the background of chromatically shifting diminished seventh-chords and an oscillation between harmonically unstable chords with low functional tension and a high degree of dissonance, the pedal becomes all the more insistent. Only after turning the *d* into a dominant does the last utterance resolve to G major on the word 'found'. Its semantic function is now exhausted. With the resolution to the tonic, the call is no longer necessary. Motion returns on stage as Aeneas takes action again.

Berlioz earned enthused reactions from his contemporaries for his use of pedals in *Les Troyens*. Joseph d'Ortigue, who attended the dress rehearsal of the 1863 premiere of the opera's second part, wrote to Berlioz: 'What an [achievement in] instrumentation as that of the Septet with its pedal c in the treble, and these pedals in the low registers with the *piano* [sounds of the] bass drum!'[46] It is characteristic that d'Ortigue mentions both the pedal as device and the instrumentation in one breath, and that he refers to pedals in the bass and the treble. Julian Rushton has pointed to the central role of both types of pedals for the composer, noting that Berlioz prefers pedal tones with a freely floating character that reinforce harmonic ambiguity rather than stabilising harmony.[47]

A comparison of the ghost scene with the Septet reveals that the pedal tones relate to opposite expressive values in both scenes, although each scene in its own way creates a sense of immobility. In the Septet, all the main actors – Trojans and Carthaginians – join in a hymn to the sea that praises the beauty of the moment. The gently rocking movement of the waves epitomises their desire for the situation to endure. Their simultaneously moving voices every now and then create dissonances with the pedal tone, when the harmony oscillates between F major and its submediant D♭ major. The resulting dissonances, however, seem absorbed by the feeling of rest suggested by the movement to and fro. The human voices that gather in the middle range create a dense sound as opposed to the 'hollow' sound that will later characterise the ghost scene. In this praise of Venus and her element, the sea, the question of whether the pedal tone can be said to represent fate remains ambiguous. Just as the pedal note *d* confirms its function of embodying fate when it disappears, resolving to *g*, so the strikes of the bass drum that are

[46] Berlioz 1995, 6:504. [47] See Rushton 1983, 111.

interpolated within the vocal harmony only reveal a threatening character when they reappear at the end of the act. Now they introduce the uncanny use of a hidden tamtam on stage. Hitting Aeneas' weapons, Mercury produces a tamtam sound – that seems to come from far away, before he calls: 'Italie'.

Calling the pedal a *note-son* emphasises a colouristic use of pitch. Additional evidence for this view may be found in Berlioz's reaction to an invention of nineteenth-century instrument making: pneumatic instruments with freely vibrating metal tongues that could produce stable tones for an unlimited time that allowed for nuancing in intensity. In the second edition of his *Grand traité*, Berlioz included a chapter about new inventions, where he mentioned an instrument called '*mélodium avec prolongement*'.[48] This instrument added a 'prolongation' register to a regular harmonium or piano. In the regular pianoforte, raising dampers by using the sustaining pedal brought the inconvenience that all notes would resonate. Lifting a single damper had previously required keeping the key pressed down, and the same was true for the harmonium, where the key had to be pressed to keep a tone constant. This prolongation register instead freed the fingers from this task and opened up new possibilities of combining long and short notes. The exploration of pedal notes in a musical setting therefore profited from this new invention, as Berlioz demonstrates, showing in particular examples of treble notes to be held by the prolongation mechanism. In this way, these keyboard instruments would finally enable composers to probe orchestral effects, as Berlioz declared enthusiastically. His scepticism towards the piano, whose sounds did not ostensibly allow distinguishing layers of sounds, seemed remedied.

The mechanism used for the prolongation functioned using knee levers, both in its piano and harmonium versions. Berlioz hastened to add that, as for the regular harmonium – or, as the instrument produced by his favourite brand Edouard Alexandre is called, the *orgue mélodium* – the prolonged notes could be modified in their intensity. The *orgue mélodium*, he emphasised, was 'expressive': it possessed crescendo and decrescendo, applicable to any note while resounding. As opposed to regular organ pipes, in which changes in dynamics would destabilise pitch, instruments with freely vibrating tongs like the *orgue mélodium* allow for dynamic nuancing that leaves pitch unaffected.[49] With these instruments' constant

[48] Berlioz, *Grand traité* (NBE 24), 472–4 (L'orgue mélodium d'Alexandre) and 475–7 (Pianos et mélodiums d'Alexandre à son prolongé).

[49] On the history of these instruments see Restle 2002.

but nuanced tones, the pedals in Berlioz's musical setting share important features. They are fully flexible in their expression, yet their length can be adjusted to the needs of the dramatic situation, rather than being restricted by human breath. This very feature allows pedal tones in *Les Troyens* to embody fate and its inhumane message that forces Aeneas to renounce his love and his comfort in the here and now.

Whenever Berlioz commented on new technological developments in keyboard aerophones, he emphasised the possibility of nuancing the tone. He notes this for the newly developed swelling stop in Aristide Cavaillé-Coll's organs; for the metal tongs in the *orgue mélodium*; and he also noted in the *Grand traité* that the melodium was often portable, therefore introducing an additional spatial index to its use: 'a greater or smaller volume of sound can be obtained depending on the way the feet propel the bellows mechanism and on the location of the instrument'.[50] All these features resurface in the first part of *Les Troyens*, where he uses the concept of a fade to stage the ghost of Hector. In the second part, by contrast, the possibility of indexing space through intensity is inverted. Here, the voice of fate has no spatial index and therefore cannot undergo nuances in its intensity. Tension is created through harmony and omnipresence of the sound.

Perhaps most importantly, Berlioz is interested in expression as it is embodied in such technical innovation because these instruments externalise the main index of spatial perception. In the *Symphonie fantastique*, intensity could be described as an index of the outside world for the sensing subject. With 'expressive' instruments, by contrast, intensity is now a matter of regulation and control. Listener, composer and musician participate in the same flux of expression. 'Expression' in these instruments, in turn, is synonymous with dynamics. In short, expression is the result of externalising the nuancing of intensity.

Against this background, Berlioz's notion of timbre as 'impression *sui generis*' obtains a new meaning. As the two scenes analysed above demonstrate, timbre takes the lead: first, in the subtraction of time – when the beauty of the moment is celebrated against the will of fate – then, in the subtraction of space when Aeneas is finally forced to submit to his fate. In both situations, the human actors are no longer just witnesses to an acoustic presence. Instead, they act against or in accordance with the voice of fate that is unnoticeably present or dominant in the musical sound. Accordingly, the pedal is either masked, through integrating it

[50] Macdonald 2002, 311.

into the overall harmonic immobility, or it is bent towards a resolution, through accepting it as the harmonic function of the dominant. The co-presence of humans and supernatural elements now reaches beyond a dichotomy of the dead and the living. Timbre here contributes to creating yet another function for the imaginary. While the implosion of the dichotomy between the dead and the living sets the warriors of Troy in action and makes them face an as-yet unknown future in Rome, it leaves the Carthaginians without any option to act. They can only watch the boats that have left their shores. Yet, instead of acting, they are seized by a state of 'clairvoyance', as one could say using a notion developed by Gilles Deleuze for a type of (cinematic) image that emerges from cutting perception of its prolongation into action.[51] Bound to remain in their space, the Carthaginians see the future that will turn the conflict into one between their state and that of Rome.

Conclusion: Spatial Imagination and Experiment

Imagination as a mode of producing the new is what intrigued Boulez about the work of Berlioz; however, that which is new escapes prescription. Writing a treatise about instrumentation, Berlioz admitted that good instrumentation requires inventiveness, even genius, but these could not be taught. Some of the conditions for the emergence of new and convincing orchestration were nevertheless accessible to description and to control. To become a visionary for musical sounds meant first of all to use one's hearing. It required an awareness of the flows of sound that take place in a performance. Here the listeners' role was not much different from that of the musician and, especially, the conductor, as the use of hearing is not restricted to either of these roles but must be part of all of them. Its function and tasks are imposed by the musical sound as soon as this sound begins. The exploration of musical sounds is shared by all parties.

If – as suggested by Magendie – experimentation had to become a means to explore what is not yet known, this also holds to some extent for the musical exploration Berlioz envisages in his composition. Space as an object of exploratory experimentation was shown to be problematic. For the Romantic subject, space was not a given. The need to explore, experience and construct space comes to the fore when Berlioz mixes his precise

[51] Deleuze 1997, 18–24.

empirical observation of hearing with his visionary grasp of sound. When the real and the imaginary become indistinguishable, as happens in the musical description of hearing subjects as well as in the liminal figure of the ghost, the exploration of the auditory space becomes particularly productive. Orientation in space can be achieved through a distinction of acoustic cues that create points of perception, and the opposition of absence and presence in space can be stages with the help of timbral features. Both are recurring issues of Berlioz's music, as I have tried to show in this chapter. Within his peculiar mode of exploration, the listener could join the composer in exploring these questions. They could experience how intensities guide or mislead us about the distances of sounds, they could witness the acoustic emergence of a figure that has no bodily existence, and they could follow acoustic properties of a sound with enhanced individuality and spatial identity in opposition to a sound that lacks these characteristics. In each case, the listener would not be left with their individual interpretation of the musical processes they heard, but would have to compare their actual experience with the conditions of sensory perception more generally. If this does not translate into science, it nevertheless approaches an empirical mode: exploration through experimentation.

Today Berlioz's explorations of auditory space seem accessible to scientific scrutiny. Spatial hearing is understood to be composed of a multifactorial input from intensities, difference in phase and intensity between both ears, and timbral filtering through the shape of our ears. During Berlioz's lifetime, however, experimental research on auditory spatial perception barely got further than Magendie's first findings. Too little was known about what constitutes sound and how sound was perceived. A decussation of the auditory nerves – that is, a connection that links the two ears before they reach the brain – was only discovered long after Berlioz had died. In 1875, Lord Rayleigh would still summarise the state of research on auditory space perception in a pessimistic tone:

> I am obliged to leave the question in rather an unsatisfactory state, for my calculations are very far from explaining the facts; in fact, they rather go to take away the force from what had hitherto been supposed to be the explanation. At one time I was almost inclined to suppose that we did not distinguish through our ears at all, but in some other mysterious way.[52]

[52] Rayleigh 1875, 79.

A clearly comprehensible concept of auditory space was unavailable, and an experiential realm, such as the one Berlioz accessed in the Paris Opéra, did not translate into workable scientific concepts. Both for him and for his listeners, then, Berlioz's explorations of auditory space had to remain within the realm of 'inventive "madness"'.